Community Perspective for Environmental Modeling

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Ocean & Weather Modeling Accomplishments

- High resolution global ocean models accurately predict path of Gulf stream
- Weather models predict the location & structure of thunderstorms 6 hours in advance
- New operational forecast system incorporating years of scientific research reduces average forecast hurricane track error by over 40% (~150 miles)
- Incorporation of soil, vegetation & atmospheric interactions improves short term weather prediction for conditions critical to air quality simulation

Environmental Impact Modeling Accomplishments

- Sediment models quantify effects of large storms on the resuspension of hazardous contaminants from lake & stream sediment
- Groundwater transport models used to develop effective remediation strategies
- Ground motion models quantify effects of earthquakes over Los Angeles Basin
- Modeling framework enables wide-spread use of advanced air quality models by State & local groups
- 3-D interactive visualization of meteorological & environmental data

Holistic Environmental Modeling

Vision

Community-developed holistic environmental predictive capability for problem assessment & management strategies

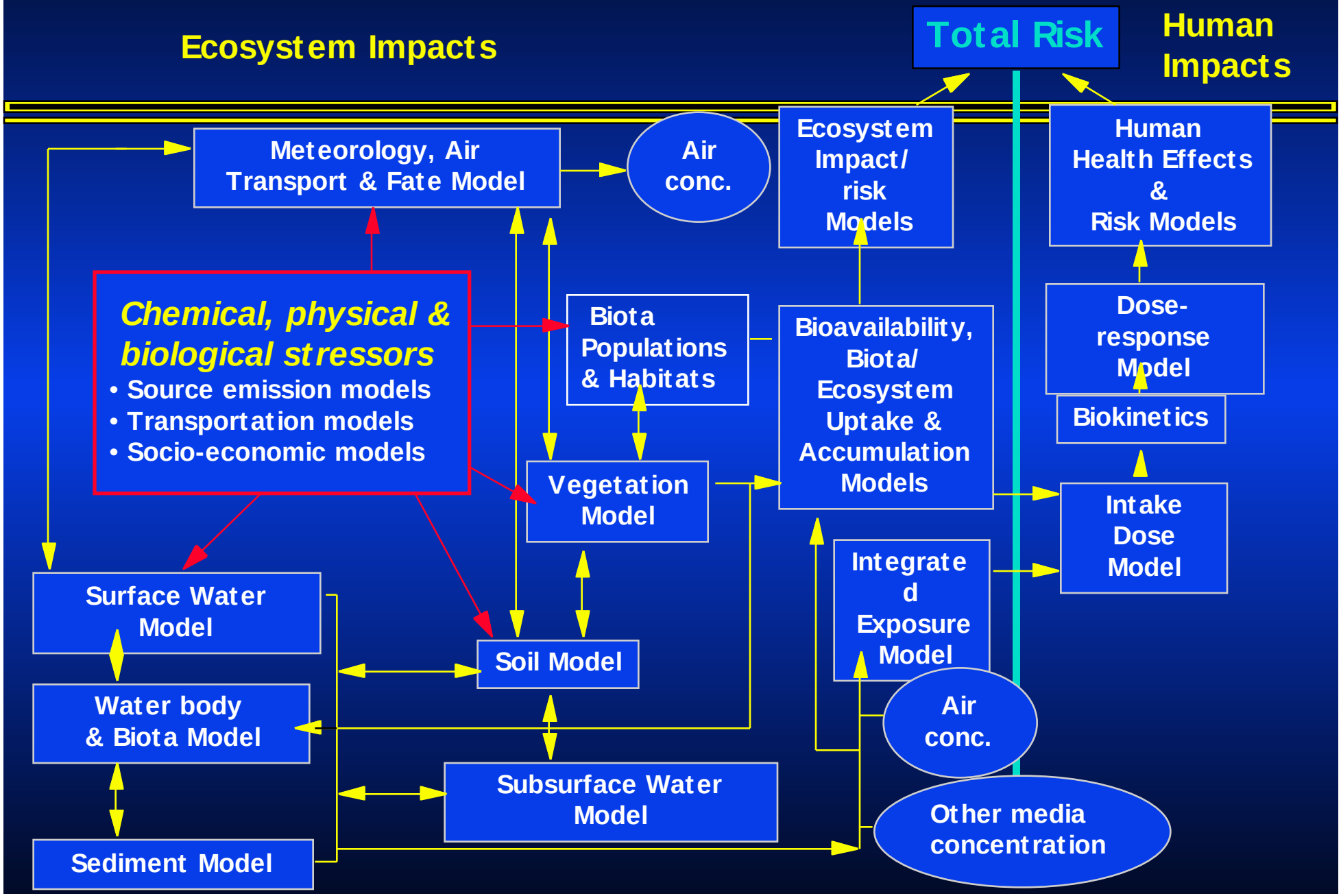
Goal

- ***Community Environmental Framework*** **to serve as a foundation for building & using complex multi-discipline modeling & assessment tools**
  - » **Multi-discipline, multi-pathway environmental modeling**
  - » **Risk assessment**
  - » **Risk management**

Rationale

- Growing need to *treat all resources* in a community - water, air, land, biota - *as inter-related parts of a holistic system*
- Global/ National scale with broad societal use & impact
- Scope and complexity too large for piecemeal approaches; Uncoordinated efforts difficult to integrate
- A community-developed consensus approach is needed; HECCWG can facilitate
- CIC technologies are drivers for collaboration
- Cross-cutting with NGI & Crisis Management
- Linked to Global Climate Change Program - Regional impacts

Holistic Predictive Capability



STRATEGY

- HECCWG facilitates broad coordination
  - » HECC agencies: EPA, NOAA,DOE, NASA, DOD, NSF
  - » Other federal, academic institutions & CENR
- Conduct useful, targeted prototype projects
  - » First use of NGI testbed (s)
  - » Develop/ test CIC technologies
- Conduct workshops to:
  - » Obtain agency/ community acceptance of concept
  - » Assess strengths & weaknesses of prototypes
  - » Establish guidance & methods for interoperability
  - » Establish mechanism for continued community support

CIC Technology Research Areas

- Scalable computational algorithms
- Synchronization of inter-model communication
- Distributed heterogeneous computing
- High performance geospatial analysis & process model integration
- Data management, access & environmental libraries
- Dynamic, intelligent human-computer interfaces for information access & synthesis

BENEFITS

- Long-term predictive environmental management capability to enable detection of potentially devastating effects early enough to avoid the full consequences
- More effective environmental policies for improved air & water quality
- Improved understanding of natural phenomena & effects of humans on the environment
- Protection of human health and ecosystem resources
- Rapid incorporation of improved science into management tools
- Leverages on existing problem solving efforts